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Chapter 6: Mixed methods research – achieving a robust design

Key Chapter points

- ‘Mixed-methods’ research is a broad term that can refer to the integration of qualitative and quantitative elements of research at several ‘levels’ (Biesta 2010: 99) - including the levels of data, method and research design.
- Mixed-methods research positions the researcher as an ‘artful craftsperson’ (Greene 2007: 16) or as a ‘connoisseur of methods’ (Teddlie & Tashakkori 2010: 8), who creates the most appropriate research design for the problem or issue in question.
- The novice researcher requires a knowledge of key aspects of debate and development within the field of mixed-methods research – the ‘what, when, why and how’ of mixed methods.

Introduction

Mixed-methods research, at its most simple, involves the collection, analysis, and combined use of both quantitative and qualitative data to address a research problem within a single study or a series of studies. Miles and Huberman (1984: 15) defined quantitative data as that based on numbers, and qualitative data as that based on words, whilst others focus on other qualities of the data, for example whether it is ‘closed-ended’ or ‘open-ended’ (Johnston & Turner 2003: 299). Creswell (2015: 2) defines mixed methods research as:

‘an approach to research in the social, behavioural and health sciences in which the investigator gathers both quantitative (closed-ended) and qualitative (open-ended) data, integrates the two, and then draws interpretations based on the combined strengths of both sets of data to understand research problems.’

Such a definition is a useful starting point, as it serves to illustrate two key points about mixed-methods research:

- (i) mixed-methods research requires at least one qualitative and one quantitative data set
- (ii) mixed-methods research involves the ‘integration’ or mixing of the qualitative and quantitative data.

Studies which involve the use of multiple qualitative *or* multiple quantitative data sets or approaches are therefore examples of ‘multi-method’, rather than ‘mixed-methods’ research (Teddle & Tashakkori 2003, Creswell, 2015).¹

Mixed-methods and research design

Mixed-methods research may form part of other research designs, such as case-study design, quasi-experimental design, ethnography or action research (Coffey & Atkinson, 1996; Sandelowski, 1996; Reason & Bradbury, 2001; Luck et al., 2006;), or may form part of a distinctly mixed-methods research design (Creswell & Plano Clark, 2011; Johnston & Christensen, 2014). The choice between a mixed-methods design and a mixed-methods approach embedded within another research design depends on the ‘logic of enquiry’ (Hedges, 2012) of the research – that is to say, the conceptual, theoretical and methodological framing of the study. Hedges (2012) notes that decisions about the logic of enquiry for a particular research problem will be shaped both by the discipline or ‘intellectual traditions’ in which the researcher is working and by the researcher’s own conceptualization of the research problem, which is shaped by the researcher’s experiences, values and beliefs.

Mixed-methods research – achieving a robust research design

This chapter aims to support your reflection on the logic of enquiry that will underpin your own mixed-methods research - whether you choose a ‘mixed-methods design’ or choose to use mixed methods within another research design. The chapter will first summarize key aspects of debate and development within the field – the ‘what, why, when and how of mixed-methods research’ – and will then focus on key considerations and processes when planning a research design involving the collection and integration of both quantitative and qualitative data within education.

What is mixed-methods research?

In the introduction it has been stated that mixed-methods research, at its simplest, involves the collection, analysis and interpretation of both quantitative and qualitative data to investigate a particular phenomenon or research problem. This definition, which focuses on the use and integration of qualitative and quantitative data at a ‘methods’ level, emerged in what

¹ For more information on multi-method approaches, see Hesse-Biber and Johnson (2015).

Tashakkori and Teddlie (1998: 15) would classify as the ‘first stage’ of the evolution of mixed research, from about the 1960s to the 1980s. They note that wider discussions about the purposes, practices and possibilities of empirical research during this period – debates widely known as the ‘paradigm wars’ – facilitated such a movement from ‘monomethod’ to ‘mixed methods’ research.

At their core, the ‘paradigm wars’ involved debates about the relationship between philosophy (epistemology, ontology) and practice (methodology, methods) within empirical research (for summary, see: Johnson & Onwuegbuzie 2004). The debates were significant in the development of mixed methods research, as they resulted in a move away from a purist paradigmatic approach – which argued there to be a suite of characteristics (from philosophy to method) associated with qualitative and with quantitative research, and for the two paradigms to be ‘incompatible’ due to incommensurable underlying beliefs about the nature of knowledge and of reality (Lincoln & Guba, 1985; Smith & Heshusius, 1986). Rather, there emerged a move towards consideration of how qualitative and quantitative methods could be used in a ‘compatible’ way to address research problems (Reichardt & Cook 1979; Bryman 1988; Howe, 1988), with Reichardt & Rallis (1994: 85) calling for a ‘new partnership’ between ‘qualitative and quantitative inquiries’.

The explosion of interest and work in the field of mixed-methods research in the attempt to explore the possibilities of pragmatically combining qualitative and quantitative approaches led to what Tashakkori and Teddlie (1998: 16) call the ‘second stage’ of the evolution of mixed research. Emerging around the 1990s, this involved ‘moving away from the consideration of distinctions [between qualitative and quantitative approaches] in *method alone* to the consideration of distinctions in all phases of the research process’ (1998: 16), for example, when framing the research problem or when engaged in study design. Early studies which mixed qualitative and quantitative elements at the methodological level were variously termed ‘mixed model’ studies (Tashakkori & Teddlie, 1998), ‘methodological hybrids’ (Bryman, 1988) or ‘mixed-methodology design’ (Patton 1990; Creswell 1995) to distinguish them from ‘mixed-methods’ studies that mixed only at the level of methods. Johnson and Onwuegbuzie (2004: 20) summarized the distinction when they noted there to be ‘two major types of mixed methods research: mixed model (mixing qualitative and quantitative approaches within or across the stages of the research process) and mixed-method (the inclusion of a quantitative phase and a qualitative phase in an overall research study).’

However - and significantly for our understanding of what ‘mixed-methods’ research is - such terminological distinctions have waned over time, with ‘mixed methods’ research

becoming an umbrella term for studies that integrate quantitative and qualitative elements at the level of data, method, or more extensively, for example, in the research objective, methodology and/or worldview. This was acknowledged in the editorial to the first issue of the *Journal of Mixed Methods Research* in January 2007, when Tashakkori and Creswell noted that such a ‘broad’ definition of ‘mixed-methods’ research had been adopted for the journal ‘as an effort to be as inclusive as possible’ to those contributing to the field (2007: 4). Johnston et al. (2007: 118), following Greene (2006), note that what this means in practice is that the term ‘methods’ in ‘mixed-methods research’ should now also be interpreted ‘broadly,’ encompassing consideration of the mixing of qualitative and quantitative elements at the level of methods, methodology and research design, and also encompassing ‘related philosophical issues (e.g. ontology, epistemology, axiology)’. Such breadth is reflected in Johnston et al.’s ‘general definition’ of mixed-methods research, which emerged from analysis of definitions provided by twenty-one leading researchers in the field (2007: 119-20).

Why choose mixed-methods research?

Biesta (2012: 147) argues that mixed-methods research should be considered for a study if having both quantitative and qualitative data would provide a ‘more accurate and adequate understanding’ of the research problem in question than would have been possible with the use of quantitative or qualitative data alone. The criteria for the use of mixed methods here thus relates to their contribution to a *particular* research problem or research question(s) within a *specific* research context, a position supported by several other mixed-method theorists (Tashakkori & Teddlie 1998, Bryman 2008, Symonds & Gorard 2010, Creswell & Plano Clark 2011, Hesse-Biber 2015). Frameworks which outline the possible rationales for using mixed methods include those of Greene et al. (1989), who identified five purposes – triangulation, complementarity, development, expansion and initiation (Table 6.1) – and Bryman (2006), who identified sixteen.

Table 6.1: Purposes of using mixed-methods research (adapted from Greene et al., 1989)

Triangulation	Data derived from qualitative and quantitative methods are compared to test the consistency of findings produced. Aims to increase validity of findings by counteracting method or inquirer bias.
Complementarity	The complementary strengths of qualitative and quantitative methods (e.g. depth and breadth, inductive and deductive approaches) are used to clarify and illustrate results. Using both qualitative and quantitative approaches is believed to counteract ‘weakness’ or ‘bias’ in each method, and thus to increase the validity of study constructs and results.

Development	Use of one method to inform the use of the other method. For example, use of qualitative interviews to identify variables for inclusion into a quantitative survey, or use of a survey to identify participants for a qualitative follow-up study.
Expansion	Aims to expand the scope (depth or breadth) of the study through the use of both qualitative and quantitative data.
Initiation	Uses qualitative and quantitative methods as different lenses for examining a research problem – looking for contradictions, and the stimulation of new thinking.

Considering which rationale(s) underpin the choice of mixed methods for your study provides a *justification* for their use, which Bryman (2008) notes to be a crucial element of rigor when presenting mixed-methods research. Identifying the purposes of using mixed-methods approaches in your study also helps to inform decisions about the choice of research design (see pp.118-22).

What can be mixed, when and how?

It was noted earlier that mixed-methods research involves the combination of elements of qualitative and quantitative approaches – for example ‘qualitative and quantitative viewpoints, data collection, analysis, inference techniques’ (Johnson et al., 2007: 123). However, Biesta (2012: 148) notes that such broad definitions do not make it sufficiently clear for the novice researcher ‘what one is actually trying to mix and combine,’ and what types of mixing are possible. Biesta (2010) explored this issue in detail, considering the possibilities for mixing qualitative and quantitative approaches at the levels of: (i) data, (ii) methods, (iii) design, (iv) epistemology, (v) ontology (vi) purposes of research (e.g. to explain or to understand) and (vii) practical roles of research. Biesta (2010, 2012) noted combining qualitative and quantitative approaches at the levels of data, methods and even research design to be relatively unproblematic. However, he challenged the notion that one can combine ‘qualitative and quantitative viewpoints’, that is to say, to mix at the levels of epistemology and ontology. Biesta (2010: 102) notes:

‘within the context of mixed methods research, the question is not *whether* it is possible to combine different epistemological assumptions or positions – this is obviously not possible. The question rather is *which* epistemological beliefs one wishes to use for the design and justification of one’s research.’

The mixed-methods researcher must thus identify a philosophical stance in relation to their research design, and must make decisions about when and how to mix qualitative and quantitative elements within their study. Key options regarding such philosophical positioning,

and core considerations when combining qualitative and quantitative methods and data, will be outlined below.

Philosophical framing of mixed-methods studies

The literature on the philosophical underpinnings of mixed-methods research is vast and complex, and is often still entwined in the long-standing debates relating to paradigms – in which epistemological positions of positivism and interpretivism are respectively associated with quantitative and qualitative methodological approaches, methods and data types (Platt 1986).² The philosophical framing of a mixed-methods study depends on a researcher's view of the relationship of epistemology and method (see Chapter 1), and on their position on whether it is the researcher's worldview, or the research design, that guides the philosophical assumptions underpinning a mixed-methods study. Creswell and Plano Clark (2011: 43) identify two main options in relation to framing mixed-methods research: (i) to use a single worldview or (ii) to draw on multiple worldviews. They argue that the choice of a single or multiple worldview can be guided either by researcher preference (selecting the approach that best fits with a researcher's epistemological, ontological and axiological positions), or by the research design. We will explore each of these options in turn.

Researcher stance: A single worldview

Within the mixed-methods literature, pragmatism and the transformative approach are the most frequently cited perspectives in discussions of 'single worldviews' that can underpin mixed-methods research.³ The core components of these perspectives will be briefly outlined below. The philosophy of pragmatism is associated with a pluralistic ontological position (that is to say, reality is multiple and complex) and an epistemology which believes that building knowledge involves 'interactions' or 'transactions' with the environment (Dewey, 1929). Following Charles Sanders Pierce (1893), pragmatism advocates an anti-dualistic ontological stance of 'synechism' – that is to say, viewing the world in terms of continua, rather than binaries (Johnson & Gray, 2010), and following John Dewey (1929), emphasizes the

² Niglas (2010) notes that, although the paradigmatic view advocated by Guba and Lincoln (2005) has now extended to five paradigms – positivism, post-positivism, critical theory, constructivism, and participatory – there is still believed to be incommensurability between the epistemological and ontological assumptions underpinning those based on positivist epistemologies (positivism and post-positivism) and those based on interpretivist epistemologies (critical theory, constructivism, participatory).

³ Realism is also emerging as a 'single worldview' philosophical stance for mixed-methods research (see Maxwell & Mittapalli 2010, Hall 2013b, Pawson & Tilley 1997).

importance of context in research, and the effectiveness of an intervention in solving, or furthering understanding of, a problem. In practice, a pragmatic approach eschews any paradigmatic divisions between qualitative and quantitative research and rather focuses on selecting the most appropriate methods from the ‘quantitative-mixed-qualitative continuum’ (Teddle & Tashakkori, 2009: 28) for the planned research intervention to address the research question(s). The aim is to make justifiable conclusions, what Dewey would call ‘warranted assertions,’ from the study in relation to the research environment. Mixed-methods methodologists who frame work within pragmatism include Tashakkori and Teddle (1998, 2003), Johnson and Onwuegbuzie (2004), Morgan (2007), Denscombe (2008), Teddle and Tashakkori (2009), Feilzer (2010), and Johnson and Gray (2010).⁴ Some of these authors would argue mixed-methods research to be a ‘third ... research paradigm’ (Johnston et al. 2007: 112), associated with pragmatism (see also Johnston & Onwuegbuzie 2004, Denscombe 2008). However, Biesta (2010) outlines his views on the possibilities and limitations of pragmatism as a philosophical framework for mixed-methods research. The ‘transformative’ perspective has also been suggested as a philosophical framework for mixed-methods research (Mertens et al. 2010, Mertens 2012). Research conducted within this framework is focused on issues of social justice, and this axiological (values) dimension permeates the ontological, epistemological and methodological approaches in the study. A ‘transformative’ mixed-methods study typically starts with a qualitative approach to create a collaborative dialogue between the researchers and the community and is supplemented with quantitative approaches where this would take the social justice agenda forwards in the particular research context (Mertens 2012).

Researcher stance: Multiple worldviews

This position involves a researcher drawing on *multiple* worldviews within a mixed-methods study, a stance associated with the work of Greene and Caracelli (1997, 2003), and developed by Greene (2007). This position is premised on the idea that ‘differences between philosophical paradigms or logics of justification for social scientific inquiry not only exist but are important’ (Greene & Caracelli, 1997: 8). The multiple worldview stance involves the

⁴ Johnson et al. (2007: 125) concord with the definition of pragmatism outlined above – what they would call the ‘pragmatism of the middle’ – but note there to be different versions of pragmatism to suit other mixed-methods researchers’ philosophical stances: a ‘pragmatism of the right’ (Rescher 2000, Putnam 2002) for those who have a strong form of realism and a weak form of pluralism (broadly associated with positivism), and a ‘pragmatism of the left’ (Rorty in Brandom 2000, Maxcy 2003) for those whose position accords more closely with antirealism and strong pluralism (broadly associated with interpretivism).

mixed-methods researcher ‘honouring’ the philosophical assumptions ‘regarding reality, knowledge, methodology and values’ (Greene 2007: 69) of each approach used in the study (e.g. interpretivism and post-positivism), and engaging with the evidence and insights produced by these different approaches in a dialogic or ‘dialectical’ manner in order to create ‘enhanced understandings ... perspectives and meanings’ (2007: 8). Greene (2007) notes that a researcher’s dialectical engagement with difference can occur at the levels of philosophy, theory, methods and values in mixed-methods research. She reflects that, within the dialectical approach, the researcher engages with:

‘a plurality of philosophical paradigms, theoretical assumptions, methodological traditions, data gathering and analysis techniques, and personalized understandings and value commitments ... patiently weaving and reweaving them into a meaningful pattern and a practically viable blueprint for generating better understanding of the social phenomenon being investigated.’ (Greene 2007: 16-17)

Greene and Caracelli (1997: 10) note that the aim of mixing methods in the dialectical stance is to ‘understand more fully by generating new insights’, while the aim of mixing methods in the pragmatic stance is to ‘understand more fully by being situationally responsive and relevant.’ Greene and Hall (2010) outline the implications of a researcher adopting a philosophical stance based on pragmatism, and one based on dialectics, to mixed-methods research in practice, whilst Mertens (2012) does so in relation to the transformative worldview.

Research design: Single or multiple worldviews

However, Creswell and Plano Clark (2011: 45) argue that the philosophical framing for mixed-methods research should ‘relate to the type of mixed methods *design* used, rather than [to] a worldview based on how the researcher attempts to “know” the social world’. They argue that an approach based on a single worldview is appropriate for mixed-methods designs in which the qualitative and quantitative components are conducted concurrently (where they recommend pragmatism), for mixed-methods studies in which the transformative framework is employed (where they recommend a social justice approach), or in instances in which qualitative or quantitative data are employed to enhance a ‘traditional’ quantitative or qualitative research design (where they recommend using the worldview of the primary design). For example, an experimental quantitative study supplemented with a qualitative component may be framed within a post-positivist worldview, while a case study with a quantitative component may be framed within a constructivist worldview. Creswell and Plano Clark (2011) recommend the use of multiple philosophical positions in mixed-methods studies

in which the quantitative and qualitative components are conducted sequentially – with different worldviews for each phase.

Reflecting upon the philosophical assumptions which underpin your mixed-methods research project is a key element of designing justifiable, rigorous mixed-methods research, as Hall (2013a: 15) notes that such philosophical assumptions inform what counts as ‘credible’ evidence in mixed-methods studies. Creswell and Plano Clark (2011: 38) also advise that researchers make their philosophical assumptions explicit in their mixed-methods project.

Research design for mixed-methods studies

The literature on research designs involving mixed methods is extensive, with Tashakkori and Teddlie (2010: 815) reflecting that ‘design typology is perhaps the most explored area of mixed methods and at the same time the most confusing aspect of it.’ Tashakkori and Teddlie (2003) noted that two key sources of such confusion are (i) the multiplicity of terms used to classify designs involving mixed methods and (ii) the different criteria by which various authors classify such designs. Natasi et al. (2010) provide a summary of the field, and draw a key distinction between ‘the classification of mixed methods designs on the basis of the manner in which qualitative and quantitative *methods or data* are incorporated’ and ‘the classification of designs according to the *stage or stages* [of the research process] at which mixing occurs’ (2010: 315, 317). In this section, the key options for mixing qualitative and quantitative elements at the methods and data levels will be outlined, as these are fundamental considerations for all research involving mixed methods (whether these form part of a mixed-methods design or are embedded within another research design). A consideration of options for mixing qualitative and quantitative elements at other stages of the research process will be presented in the final section, as part of a discussion about constructing robust and internally coherent mixed methods research designs.

Creswell and Plano Clark (2007) identified three main dimensions for consideration when designing research involving mixed methods: (i) the *timing* of the implementation of quantitative and qualitative approaches, (ii) the relative *priority* of the quantitative and qualitative approaches within the study and (iii) the point(s) at which the quantitative and qualitative data will be *mixed* or integrated within the study.

(i) Timing

For ‘basic’ mixed-methods research – that is to say research involving only one quantitative and one qualitative phase – there are two key options with regard to the timing of the

quantitative and qualitative data collection and analysis: concurrent or sequential.⁵ Concurrent mixed-methods studies are those in which the qualitative and quantitative phases of data collection occur in parallel, broadly over the same time period (Teddle & Tashakkori, 2009). Sequential mixed methods studies, on the other hand, are those in which the researcher conducts one phase of data collection and analysis (e.g. quantitative) before conducting the second phase using the other approach (e.g. qualitative). Concurrent studies are typically used when the quantitative and qualitative approaches provide complementary information that will enable a more complete, or a more accurate, account of the phenomenon of interest. Sequential studies are typically used when the results of one method are required to inform the content or conduct of the research with the second method (see Creswell and Plano Clark, 2011: 85-6; Teddle and Tashakkori, 2009 ch.7).

(ii) Priority

There are three possible options with regard to the relative priority of quantitative and qualitative elements within mixed-methods studies: equal priority, quantitative priority (where qualitative methods have a supporting role) or qualitative priority (where quantitative methods have a supporting role). The mixed-methods literature has developed notation to reflect these key dimensions of timing and priority (Morse 2003), with + representing a concurrent design and → representing a sequential design. Priority of elements is reflected in the use of upper or lower case letters, for example QUAN → qual would represent a sequential study in which the quantitative element had priority, and in which the qualitative element played a supporting role. Square brackets are used to represent embedded designs - where one element has priority at the level of design, and the other element is embedded within this. For example, QUAN [qual] may represent an experimental study with an embedded qualitative component, whilst QUAL [quan] may represent an ethnography with an embedded quantitative component.

(iii) Stage(s) of mixing/integration

Finally, the researcher must decide when and how to mix or integrate the quantitative and qualitative data from their study. With regard to 'when' to integrate quantitative and qualitative data, Morse and Niehaus (2016: 56) argue that there are only two points in mixed methods research that such integration can occur: (i) at the analysis stage, and (ii) at the stage of the discussion and interpretation of results. Morse and Niehaus (2016: 56) term the point of the

⁵ Studies which contain more than two phases are called 'multiphase designs' (see Creswell & Plano Clark 2011).

combined use of the quantitative and qualitative datasets the ‘point of interface,’ and note that the datasets are kept separate until this point.⁶ In practice, Bazeley (2009) argues that *all* mixed-methods research involves integration of quantitative and qualitative data at the stage of discussion and inferences, noting that ‘mixed methods research involves, as a minimum, integrating conclusions that are drawn from various [qualitative and quantitative] strands in the research.’ In addition, *some* mixed-methods research also integrates quantitative and qualitative data at the analysis stage. With regard to ‘how’ to integrate qualitative and quantitative data, a suite of techniques exist for integrating qualitative and quantitative data at the analysis stage in mixed-methods research. The most frequently used of these are displayed in Table 6.2.

Table 6.2: Mixed-methods data analysis strategies

Data analysis strategy	Description
Data transformation	This involves the transformation of qualitative data into quantitative data (‘quantizing’) or the transformation of quantitative data into qualitative data (‘qualitizing’) so that both can be analysed together. For example, quantitative data can be used to profile respondents, and this data can be converted to narrative form, and compared with in-depth interview data from the respondents.
Data consolidation	This involves merging qualitative and quantitative data to create <i>new quantitative or qualitative variables</i> . For example, Onwuegbuzie and Teddlie (2003) cite the creation of a new quantitative variable ‘family attitudes to school ethos’, constructed from data from a 5-point Likert scale questionnaire of students, and data from parental interviews that had been quantized using the same 5-point scale.
Typology development	This involves using the results from the analysis of one form of data to inform the analysis of the other form of data. The analysis of the first data type produces a set of substantive categories (i.e. a typology) which is then used to analyse the other data type. The typology could be categories of themes or categories of respondents, for example.
Data comparison	This involves the comparison of qualitative and quantitative data to identify patterns or meta-inferences. For example, matrices could be used to compare a theme identified in interview data (teacher confidence in teaching maths) by respondent group (1-5 years’ experience, 6-10 years’ experience, 11+ years’ experience).

⁶ Thus, in mixed-methods studies that integrate data *only* at the inferential stage, the quantitative data are analysed using quantitative methods and the qualitative data are analysed using qualitative methods (Greene, 2007).

Bazeley (2010) provides an overview of how these data analysis strategies can be conducted in practice, using data-analysis software such as NVivo and SPSS.⁷ To integrate at the inferential stage, Johnson and Christensen (2014: 614) recommend data comparison, in which the analysed findings of the two datasets are compared, and data integration – in which the qualitative and quantitative findings are ‘synthesised’ (Creswell and Plano Clark 2011: 67) or ‘woven’ (Greene 2007: 17) into a coherent whole.⁸ The decision on the point of integration of your quantitative and qualitative data – whether at the stage of inferences only, or within analysis and inferences – relates to the purpose(s) of your research, and the types of evidence required to answer your research question(s). Woolley (2009:7) notes that the researcher should aim to integrate the qualitative and quantitative data in a way that is ‘mutually illuminating, thereby producing findings that are greater than the sum of the parts.’

The three dimensions of timing, priority and stage(s) of integration here outlined result in eight possible combinations which form the basis of the typology of four basic (two-phase) research designs involving mixed methods outlined in Table 6.3.⁹

Table 6.3: Two-phase mixed methods research designs

Timing	Priority	Mixing (of datasets)	Summary of the research design
Concurrent	Equal	Inferences only	QUAN + QUAL or QUAL + QUAN
		Analysis & inferences	
	Unequal	Inferences only	QUAN + qual or QUAL + quan QUAN [qual] or QUAL [quan]
		Analysis & inferences	
Sequential	Equal	Inferences only	QUAL → QUAN or QUAN → QUAL
		Analysis & inferences	
	Unequal	Inferences only	QUAN → qual or QUAL → quan qual → QUAN or quan → QUAL
		Analysis & inferences	

Examples of two frequently used types of mixed-methods studies in education (Ivankova & Kawamura 2010) – the concurrent, equal status design and the sequential, qualitative dominant design – are outlined in the online materials that accompany this book. The first example is a concurrent equal status study which integrates qualitative and quantitative elements at the stages of analysis and inferences, whilst the second example is a sequential, qualitative

⁷ For more detail on mixed-methods analysis, see Caracelli and Greene (1993), Onwuegbuzie and Teddlie (2003), Onwuegbuzie and Dickinson (2008).

⁸ For further guidance on making inferences from mixed methods studies, see Greene (2007), Chapter 9.

⁹ Studies which contain more than two phases are called ‘multiphase designs’ (see Creswell & Plano Clark 2011).

dominant design, which mixes datasets at the stage of inferences only (see Examples 6.1 and 6.2 in online materials).

Activity 6.1

Consider both examples and reflect on how you could use or adapt the approaches taken for your own research.

Designing mixed-methods research in education: key considerations

So far in this chapter, we have considered what mixed methods research is, why you might like to use it, and what can be mixed, when, and how (in relation to methods and data). Throughout this discussion, we have noted that the suitability of the use of mixed methods, and of a particular research design, is assessed in relation to a *particular* research problem or research question(s) within a *specific* research context. In this final section, the steps involved in designing and conducting a mixed-methods research project will be outlined, using the three phases of research, as conceptualized by Tashakkori and Teddlie (2003), as the organizing principle. These three phases are: (i) the conceptualization phase, (ii) the experiential phase and (iii) the inferential phase. Within this, the different *stages* of research at which qualitative and quantitative elements can be mixed – which Natasi et al. (2010) noted to be an alternative way to classify mixed methods research designs – will be outlined (see Table 6.4). However, the key focus will be on how to develop a coherent, robust and justifiable research design that fulfills the core quality criteria of mixed methods research.¹⁰

Phase I: The conceptualization phase

The ‘conceptualization phase’ of research constitutes the thinking and processes involved in developing your research questions (Tashakkori & Teddlie, 2003). It involves three key stages of the empirical research process as identified by Natasi et al. (2010, Table 6.4): (i) conducting a literature review of existing theory, research, practice and policy (ii) thinking about the worldview(s) that will be used to frame the research and (iii) specifying the research purpose and research questions. Several theorists have underlined the crucial importance of the first two stages within the conceptualization phase to the validity of mixed methods research (Dellinger & Leech 2007, O’ Cathain 2010, Collins et al. 2012, Hesse-Biber 2015). These theorists focus on the importance of the researcher reflecting upon, and outlining, the philosophical stance that

¹⁰ For an overview of the key quality criteria for mixed-methods research see O’ Cathain, 2010.

will frame their study, and the values, beliefs and experiences that have influenced their research interests. Greene (2008: 13) notes such a process of researcher reflection to encompass a consideration of ontology, epistemology and axiology (values and theoretical commitments), as well as a consideration of the influence of academic reading, previous disciplinary and methodological training, practical experience in the area of research interest, and personal characteristics (e.g. socio-economic status).¹¹ Collins et al. (2012: 854) underline the importance of ‘philosophical clarity’ to evaluating the validity of mixed-methods research, whilst Dellinger and Leech (2007: 323) note the importance of knowledge of researchers’ prior practical, theoretical and academic understanding of the phenomena under study to construct validity. Indeed, Preissle et al. (2015:152) argue that such researcher reflexivity is an ‘ethical practice in and of itself’ within mixed-methods research as ‘it specifies researchers’ relationships with participants, and, as a corollary, to the data and the research.’

Other theorists have underlined the importance of the third stage of the conceptualization phase to the design of quality mixed-methods studies (Onwuegbuzie & Leech 2006, Ridenour and Newman 2008, Biesta 2012). This stage involves the identification of the research purpose – defined as the ‘primary intent, objectives and goals for the study’ (Plano Clark & Badiie 2010: 276) – and the specification of the research questions. For mixed-methods studies, Onwuegbuzie and Leech (2006) recommend that researchers also identify the purpose(s) for mixing qualitative and quantitative approaches [see Greene et al. (1989), Table 6.1] at this stage, as they note that both content and methodological objectives inform the development of appropriate mixed methods research questions. Indeed, Creswell and Plano Clark (2011: 167) recommend the specification of separate content and method research questions for mixed-methods studies, with the methods research question ‘directing and foreshadowing how and why the strands will be mixed.’

Activity 6.2: Developing your method research question

Identify the purpose(s) for using mixed methods in your study (see Table 6.1) and reflect on the proposed relationship between the quantitative and qualitative strands of your study with regard to priority, timing and mixing. Use this to formulate the method research question for your study.

- For example, an equal-status concurrent research study which aims for triangulation may pose the question: ‘to what extent are the quantitative and qualitative results consistent with one another?’
- A sequential QUAN → qual study which aims for complementarity and expansion may ask: ‘in what ways do the qualitative data help to illustrate and explain the quantitative results?’

¹¹ For guidance on options for the philosophical framing of mixed-methods studies, see pp. 115-18.

Table 6.4: The mixed-methods research process: stages of potential integration of qualitative and quantitative strands¹²

Phase of research (Tashakkori & Teddlie, 2003)	Stages of the research process at which mixing of quantitative and qualitative strands can occur (Natasi et al. 2010)			
	Stage number	Quantitative Strand		Qualitative Strand
Conceptualisation Phase	1	Theory, Research, Practice/Policy	↔	Theory, Research, Practice/Policy
	2	Worldview	↔	Worldview
	3	Purpose/Question	↔	Purpose/Question
Experiential Phase	4	Sampling	↔	Sampling
	5	Data collection	↔	Data collection
	6	Data analysis	↔	Data analysis
Inferential Phase	7	Data inference	↔	Data inference
	8	Inference quality	↔	Inference quality
	9	Data representation	↔	Data representation
	10	Application	↔	Application

¹² Although presented in a linear fashion for the purposes of the diagram, in practice research design is an iterative process, and there would be interaction across the stages and phases (Ridenour & Newman, 2008; Natasi et al. 2010).

Phase II: The experiential phase

The ‘experiential phase’ of research constitutes the thinking and processes involved in designing and conducting your research (Tashakkori & Teddlie, 2003). It involves three key stages of the mixed-methods research process as identified by Natasi et al. (2010, Table 6.4) : (i) sampling (ii) data collection and (iii) analysis. Mixed-methods theorists have underlined two key elements that a researcher should be mindful of when designing and conducting a mixed-methods study - design quality (Bryman 2008, Teddlie & Tashakkori 2009), and feasibility (Niglas 2009, Creswell & Plano Clark 2011, Johnson & Christensen, 2014). The issue of feasibility relates primarily to the time-intensive nature of conducting and analysing mixed-methods research. Thus, the scale and scope of your proposed study should be considered in relation to the time available, amending the research purpose, questions and design if necessary. With regard to design quality, Teddlie and Tashakkori (2009: 301) identified four criteria against which the design and conduct of mixed-methods research may be evaluated: (i) design suitability, (ii) design adequacy, (iii) within design consistency and (iv) analytic adequacy. These criteria respectively assess (i) the extent to which the research design is appropriate for the research questions, (ii) the quality of research conduct, (iii) the coherence of the research design and (iv) the extent to which the analytic procedures enable the research questions to be addressed. These criteria are necessarily broad due to the ‘methodological eclecticism’ (Tashakkori & Teddlie, 2010) inherent in mixed methods research, which means that there are no ‘typical’ approaches in mixed research (Biesta 2012: 149). Rather, it is up to the researcher to consider which sampling, data collection and analysis procedures are most suitable for the purpose, design, and conceptual (philosophical and theoretical) considerations of their study (Bryman, 2008). It is this that results in a mixed-methods researcher being conceptualized as an ‘artful craftsperson’ (Greene 2007: 16) or a ‘connoisseur of methods’ (Teddlie & Tashakkori 2010: 8). However, key guidance is available. With regard to sampling, Creswell and Plano Clark (2011) advise consideration of (i) who will be included in the qualitative and quantitative samples, (ii) the size of the samples, and (iii) how the participants will be recruited, with these considered in relation to the quality criteria for qualitative and quantitative research, and in relation to the purpose(s) of the mixed-methods study (see Table 6.1). For example, in a sequential QUAN → qual study which aims to use the qualitative data to expand on aspects of the quantitative findings, a smaller sample of the same participant group would typically be used. In relation to data collection, Greene (2008: 166) advises adhering to ‘the quality criteria and procedures of the tradition in which the method is being

implemented ... for warranting the quality of method and the data obtained,' an approach which is supported by Tashakkori and Teddlie (2008) and Morse and Niehaus (2016). Key mixed methods analysis procedures were outlined in Table 6.2.

Phase III: The inferential phase

The 'inferential phase' of research involves developing theories or explanations from your research by means of the interpretation of data (Tashakkori & Teddlie, 2003). It relates to four stages of the mixed methods research process identified by Natasi et al. (2010, Table 6.4): (i) data inference (ii) inference quality (iii) data representation and (iv) application. The first two stages relate to the processes of deriving conclusions from mixed-methods research (e.g. through data comparison or data integration, see pp.120-21), while the last two stages relate to the presentation of study results (in a thesis, academic paper or presentation), and their impact on theory, knowledge, policy or practice. Teddlie and Tashakkori (2009) argue 'interpretative rigor' to be the key aspect of quality when drawing inferences from a mixed-methods study. Interpretative rigor is defined as the 'degree to which credible interpretations have been made on the basis of obtained results' (2009: 303), and is evaluated against six criteria: (i) interpretative consistency, (ii) theoretical consistency, (iii) interpretative agreement, (iv) interpretative distinctiveness, (v) integrative efficiency and (vi) interpretative correspondence. The first four criteria pertain to all inferences you make from your research (whether from the qualitative data, quantitative data, or from both) and respectively relate to the extent to which your interpretations are consistent with (i) the data, (ii) current theory and knowledge, (iii) what other researchers would be likely to interpret from the data and (iv) good researcher conduct (that is to say, that the inferences are plausible and defensible). The final two criteria relate to meta-inferences, defined by Teddlie and Tashakkori (2009: 152) as 'a conclusion generated through an integration of the inferences that have been obtained from the qualitative and quantitative strands of a mixed methods study.' 'Integrative efficiency' considers the extent to which the qualitative and quantitative inferences have been effectively synthesised into a meta-narrative which makes 'meaningful conclusions,' whilst 'interpretative correspondence' holistically considers the extent to which the inferences from the research enable the research questions to be answered, and the purpose(s) of using a mixed-methods research design (see Table 6.1) to be fulfilled. Self-assessment against these six criteria involves critical reflection on the ways in which your inferences have been derived from the data – a key aspect of ensuring that conclusions are valid or 'warranted' (Dewey 1929) within the pragmatic stance – and also involves consideration of the study's contribution to

knowledge, theory, policy or practice. Such reflection on the contribution of the study underpins the ‘presentation’ and ‘application’ stages of research.

Designing mixed-methods research in education: Achieving a rigorous, coherent design

The previous section has outlined the key considerations in designing and conducting mixed-methods educational research in practice. Within this, the importance of a strong ‘inquiry logic’ – that is to say, having ‘coherence and connection’ across all levels of your research project, between the conceptual and theoretical framing, research purposes and questions, research design and conduct, presentation and impact – has been emphasized (Greene 2008: 9). The importance of rigour in mixed-methods research design and conduct has also been underlined, with the mixed methods researcher required to ensure approaches to sampling, data collection, analysis and interpretation meet relevant qualitative, quantitative or mixed-methods quality criteria. Morse (1999, 2003) recommends that a researcher conduct an ‘armchair walkthrough’ when planning a mixed-methods study, in which the researcher thinks through all aspects of their proposed project, to ensure such coherence and rigour.

Activity 6.3: The ‘armchair walkthrough’ (Morse, 1999)

Take time to think through your proposed study from start to finish. Think about your research purpose – that is to say, the aims or objectives of your study – and what personal or academic factors prompted your interest in this topic. Reflect on your research questions, and your proposed philosophical, theoretical and methodological approach. Consider whether your proposed approach will enable you to collect relevant data from a sufficient number of respondents in an ethical manner, and if your plans for analysis and presentation of findings will enable you to effectively address your research questions and make a valuable contribution to knowledge, policy direction or practice. A pilot study may provide a useful opportunity to evaluate questions that arise from such an ‘armchair walkthrough’.

Conclusions

This chapter has provided an overview of mixed-methods research, and has outlined the key conceptual, theoretical and methodological considerations when designing mixed-methods research within education.

Chapter key points

- Considers key aspects of the ‘pluralism and diversity at all levels of the research enterprise – from the more conceptual dimensions, to the more empirical ones’ (Teddle & Tashakkori 2010: 9) which characterize mixed-methods research.
- Underlines the challenges and opportunities that such diversity offers the researcher during the research design process.
- Discusses key frameworks for research design, analysis and quality criteria for mixed-methods research.
- Provides the mean to evaluate the suitability of mixed-methods approaches for early career researchers designing and conducting empirical research projects in education.

Recommended reading

Creswell, J. and V.L. Plano Clark (2011). *Designing and Conducting Mixed Methods Research*, 2nd edn, Thousand Oaks, CA: Sage.

Creswell and Plano Clark provide practical advice on designing and conducting mixed-methods research. The book provides in-depth advice and examples in relation to six key mixed-methods designs: convergent parallel, explanatory sequential, exploratory sequential, embedded, transformative and multi-phase.

Greene, J.C. (2007). *Mixed Methods in Social Inquiry*, San Francisco: John Wiley & Sons.

An accessible book which covers all elements of mixed-methods research design and practice. Chapters 8 and 9 provide excellent overviews of mixed-methods data analysis and of quality in mixed-methods research.

Onwuegbuzie, A.J. and N.L. Leech (2006). ‘Linking Research Questions to Mixed Methods Data Analysis Procedures’, *The Qualitative Report*, 11(3): 474-98.

A practical guide to developing and writing research questions for mixed-methods research, with advice on identifying mixed-methods data analysis procedures appropriate to your research questions and research design.

Advanced reading

Biesta, G. (2010). ‘Pragmatism and the Philosophical Foundations of Mixed Methods research’ in A. Tashakkori & C. Teddlie (eds), *SAGE Handbook of Mixed Methods in Social and Behavioral Research*, 2nd edn, 95-117. Thousand Oaks, CA: Sage.

Biesta critically evaluates the contribution of pragmatism as a philosophical basis for mixed-methods research. The article also critically considers the extent to which it is possible to ‘mix’ quantitative and qualitative elements at seven different ‘levels’ of the research process.

Hesse-Biber, S. (2015). 'Mixed Methods Research: the 'Thingness' Problem', *Qualitative Health Research*, 25(6): 775-88.

Hesse-Biber critically evaluates mixed-methods research from the perspectives of design, philosophy and practice.

Tashakkori, A & C.Teddlie (eds), (2010). *SAGE Handbook of Mixed Methods in Social and Behavioural Research*, 2nd edn, Thousand Oaks, CA: Sage.

A seminal edited volume, which encompasses conceptual, methodological and practical issues in mixed-methods research. Chapter 1 provides an overview of core characteristics of mixed-methods research, and also outlines key issues and challenges in contemporary mixed-methods research.

Web links

An Overview of Mixed Methods Research – Nora Jacobson, University of Wisconsin
<http://videos.med.wisc.edu/videos/33600>

An open-access lecture which provides an in-depth overview of the what, why and how of mixed-methods research.

William T. Grant Foundation Mixed Methods Resources

<http://wtgrantmixedmethods.com>

A collaboration with the University of California, Los Angeles. Provides mixed-methods resources, key readings (with an annotated bibliography) and links to other mixed-methods websites.

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